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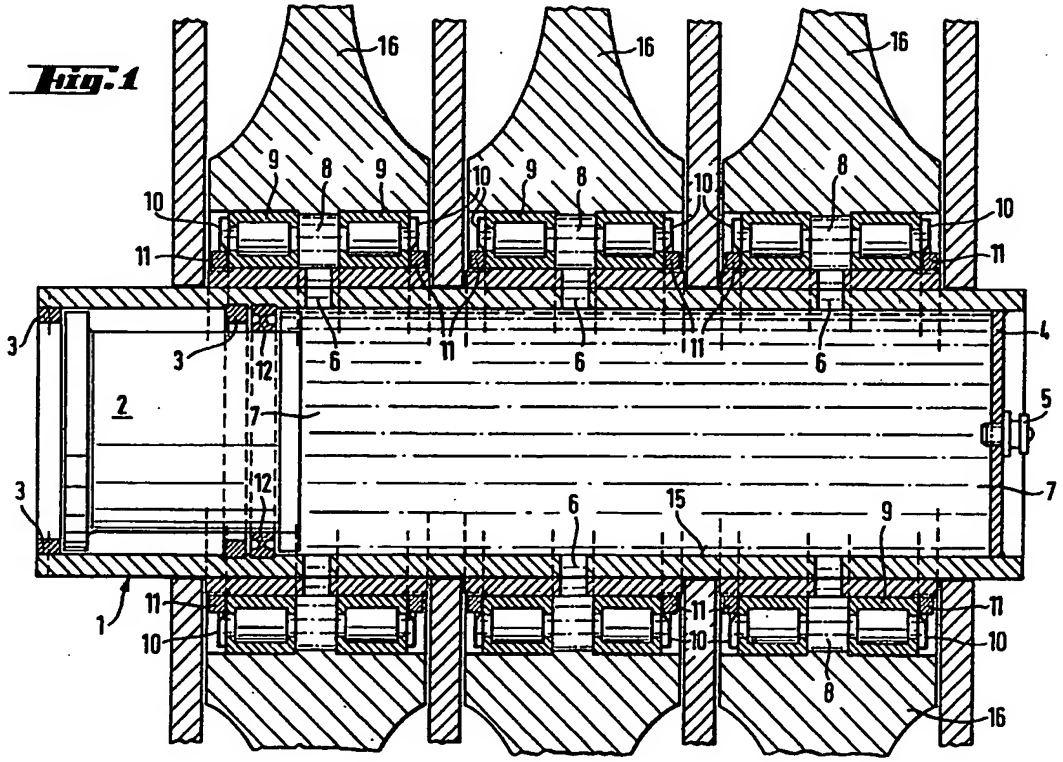
(54) A bearing assembly

(57) A sealed bearing for underwater use has a grease-filled chamber 8 separated from the water in use by external seals 10. Increased water pressure tends to cause the seals to seal more tightly. Pressure compensating means e.g. piston 2 and chamber 7 are provided to counteract this tendency by supplying the external pressure to the internal chamber. A flexible diaphragm may be used instead of piston 2.

Fig. 1



GB 2 058 244 A

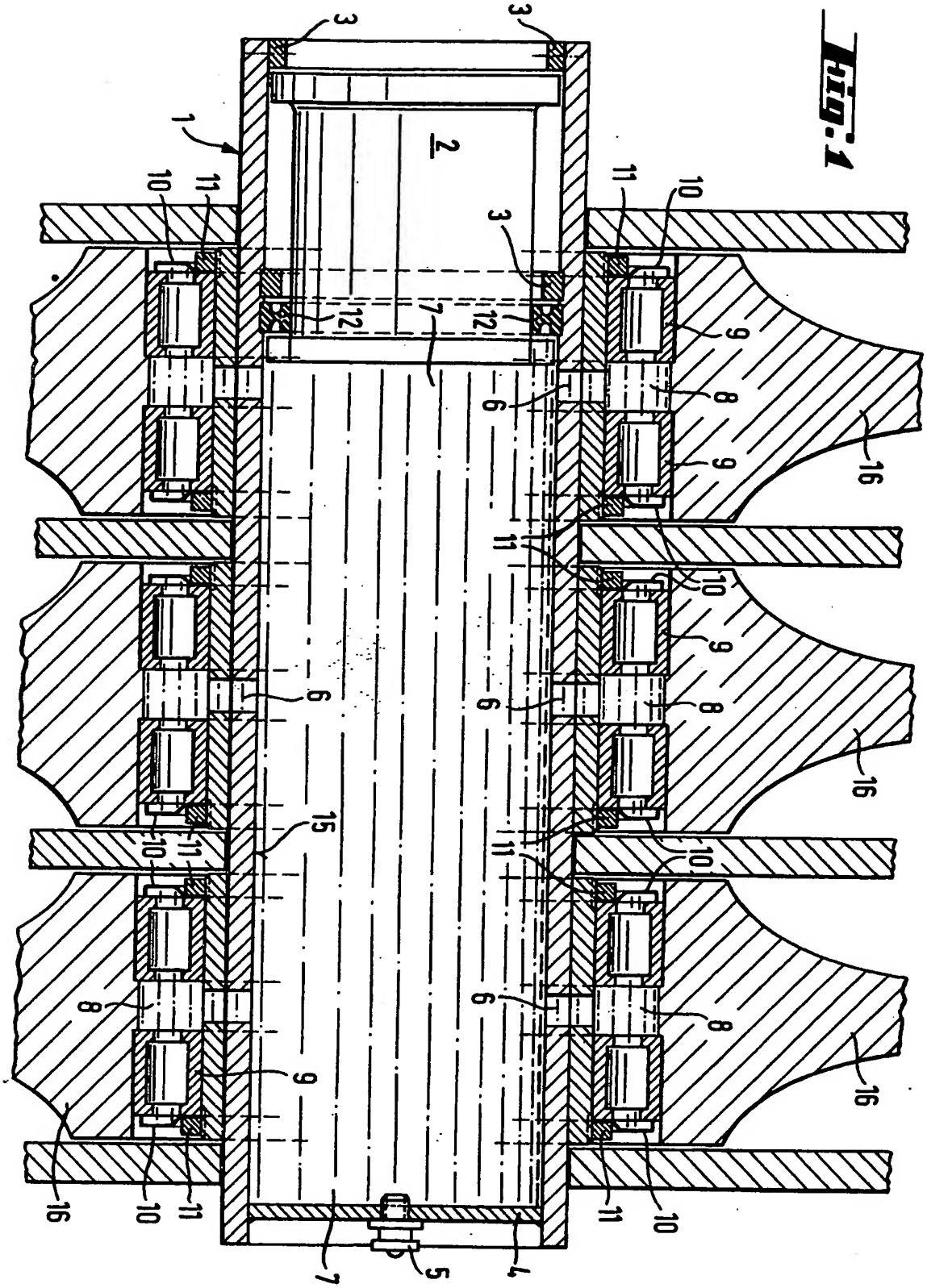


Fig.1

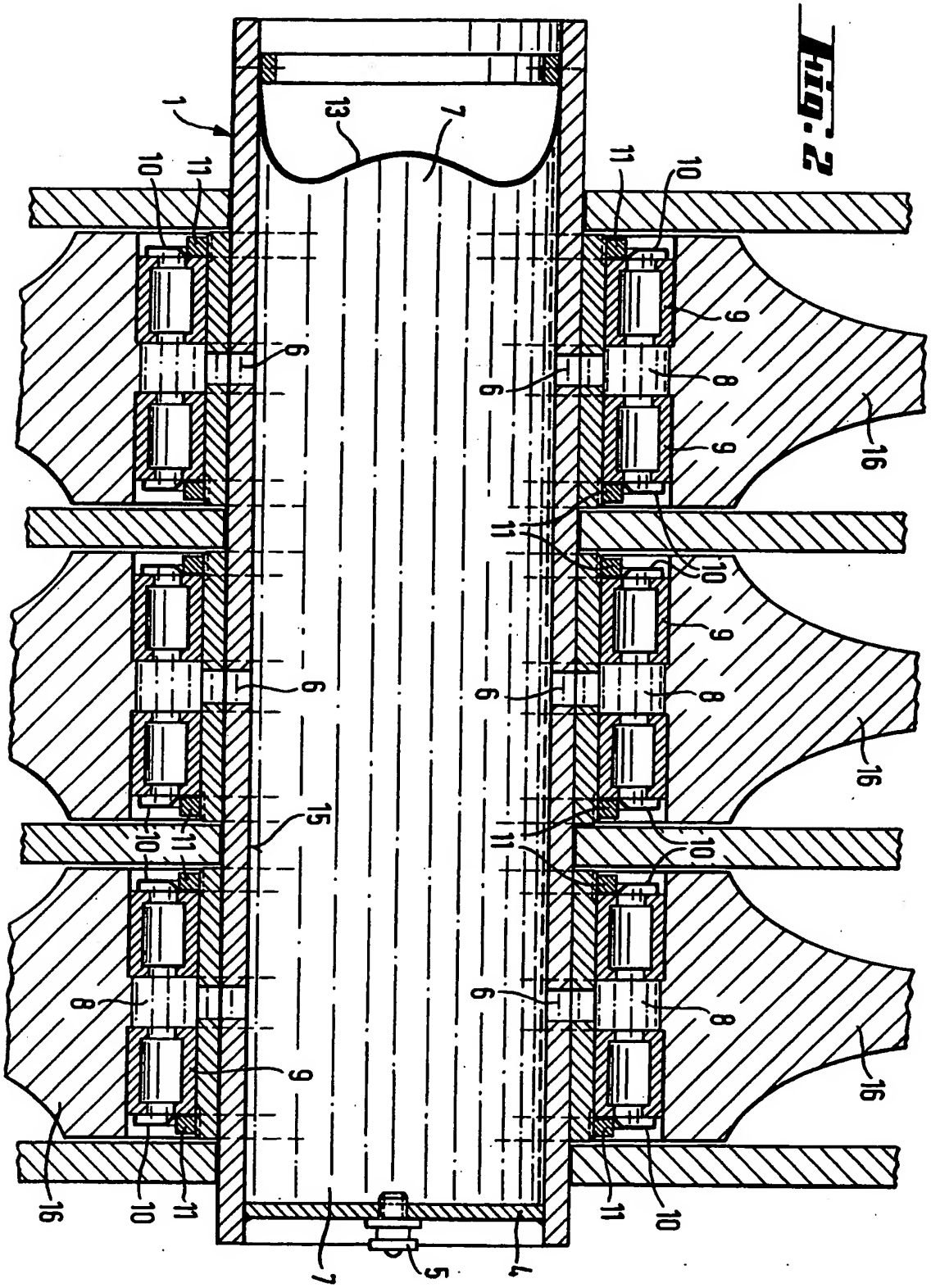


Fig. 2

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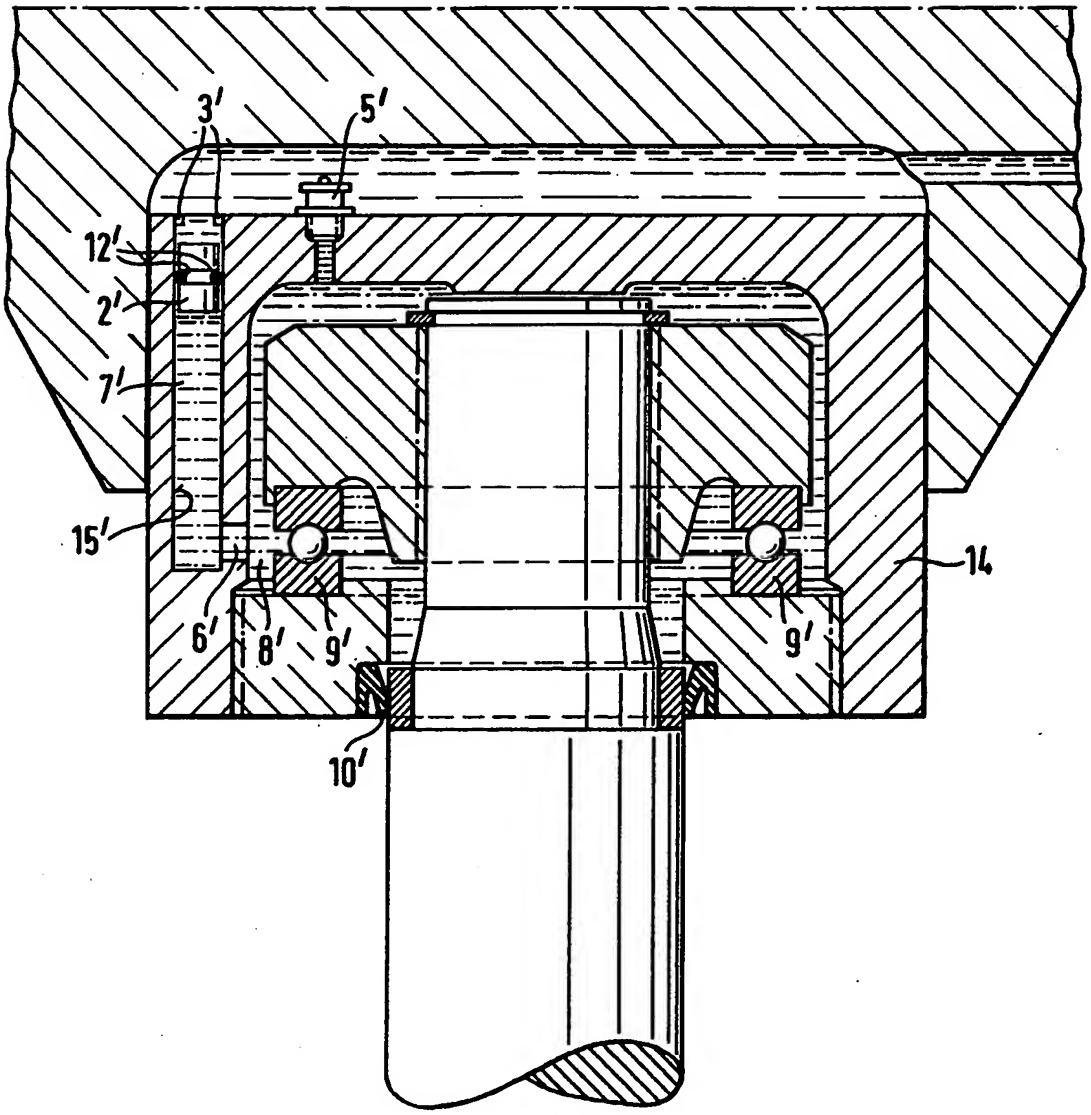
Fig. 3



SPECIFICATION
A bearing assembly

The invention relates to a bearing sealed for under-water operation, for rotatable members of a lifting device, e.g. rope pulleys and sheaves of blocks or the like which operate below the water surface.

Bearings are known which are sealed in various ways against ingress of water into the bearing. However, all these seals have the disadvantage that the higher external pressure of the water presses the seals very strongly, so that thereby the friction at the seal rises considerably. In the case of load blocks which must be lowered into the water without a load, this may lead to the fact that the block cannot be lowered any more because of the increased friction at the bearing seals.

The invention is based on the problem to construct a bearing in which the pressure in the bearing is equal to the pressure of the surrounding water at any water depth and thereby no change of the friction occurs at the seals.

The solution of this problem consists in that for the seal a pressure compensation is provided by means of an internal grease chamber which is subjected to the external pressure. By connecting this grease chamber, e.g. by means of connecting ducts, to the grease chambers of the bearing which is sealed by means of seals from the surrounding water, the seal is not subjected to an onesided pressure which depends on the depth of water, so that no change of the friction at the seals can occur with increasing depth of water.

In a further embodiment of the invention, the external pressure may affect the pressure in the grease chamber by means of a piston in a bore of a constructional component part of the lifting device or in a separate cylinder or by means of a yielding partition wall between the grease chamber and the surrounding water. These various possibilities are usable dependently upon the constructional conditions present.

The invention is explained below with reference to a few examples illustrated in the drawing. There are shown in:

Fig. 1 a section through the bearing of a plurality of pulley block rope pulleys according to the invention,

Fig. 2 as Fig. 1, but with a differently constructed pressure compensation device, and

Fig. 3 a section through the bearing of a load sheave according to the invention.

In Fig. 1 a plurality of rope pulleys 16 are arranged on a hollow pin 1. A piston 2 is arranged in the hollow pin 1 having a bore 15 and can move freely between the stops 3.

At the oppositely located end of the pin the bore of a pin 15 is closed by means of an inserted plate 4. The plate 4 is provided with a grease nipple 5 for the purpose of greasing. In the region of the rope pulleys, connecting ducts 6 are arranged in the pin 1 between the grease chamber 7 in the pin 1 and the grease chambers 8 in the rope pulley bearings. The roller bearings 9 are protected on the outside by the sealing ring 10. A nut 11 serves for securing the roller bearings 9. Between the piston 2 and the pin 1 a seal 12 is provided which is fastened in the bore 15 and which separates from each other the grease in the pin 1 and the surrounding water.

When the block is immersed in the water, the piston 2 will be pushed into the pin until the air which is possibly still present in the system is compressed to the water pressure. The pressure in the grease then corresponds to the water pressure and an unintended pressing of the seal 10 cannot occur.

In Fig. 2, a partition wall 13 of a suitable shaped resilient material which does not spring back is provided in place of the piston 2. The further arrangement corresponds to Fig. 1.

This method can be employed in all bearings which are used under water, e.g. even for load sheaves which are fitted with roller bearings. The arrangement of the piston is then provided in a separate bore.

Fig. 3 illustrates the arrangement of the pressure compensation in a load sheave. A piston 2′ is disposed in the sheave housing 14 and can move freely between the stop 3′ and the end of the grease chamber 7′ in the bore 15′. A connecting duct 6′ is provided between the grease chamber 7′ and the grease chamber 8′ of the roller bearing 9′. The grease chamber 8′ is sealed on the outside by the sealing ring 10′. The piston 2′ is provided with a seal 12′ which separates the grease in the grease chamber 7′ from the surround water. Later greasing of the bearing and the pressure compensation is effect by means of the grease nipple 5′.

It will be appreciated that the invention has application in other cases when the operation of a bearing may be adversely affected by variable ambient pressures and is not confined to bearings for use underwater.

CLAIMS

1. A bearing assembly comprising an external seal separating the interior of the assembly from ambient fluid, and pressure compensating means for varying the interior pressure to correspond to changes in the ambient fluid pressure.

2. An assembly as claimed in claim 1, wherein an interior grease-filled chamber is subjected to ambient fluid pressure by the pressure compensating means.

3. An assembly as claimed in claim 1 or 2, wherein the pressure compensating means comprises a piston slidable in a cylinder connected at one end to ambient fluid pressure and at the other end to the interior of the assembly.

4. A bearing assembly as claimed in claim 1 or 2, wherein the pressure compensating means

comprises a flexible diaphragm exposed at one side to the ambient fluid pressure and at the other side to the interior of the assembly.

5. A bearing assembly substantially as herein described with reference to and as illustrated in the accompanying drawings.

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